South Platte River, Segment 15 Habitat Improvements

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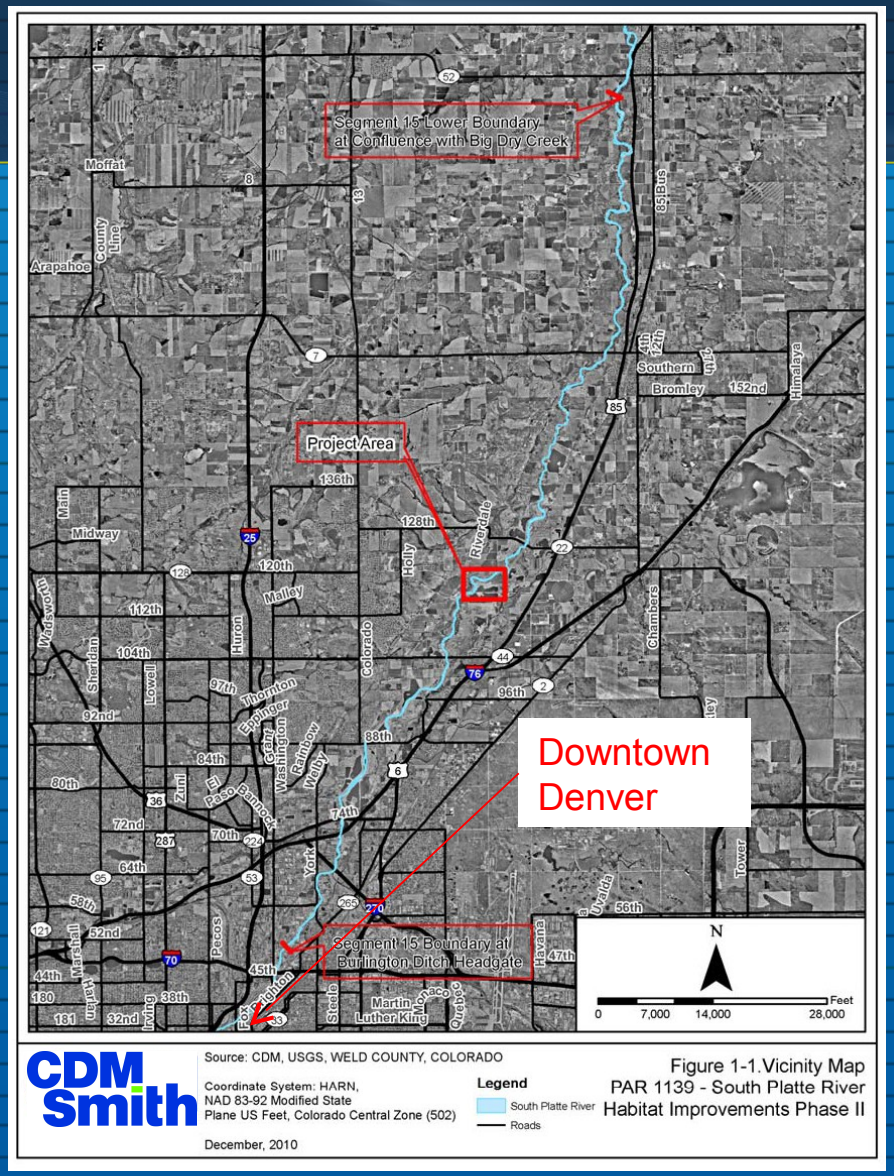
CDM Smith

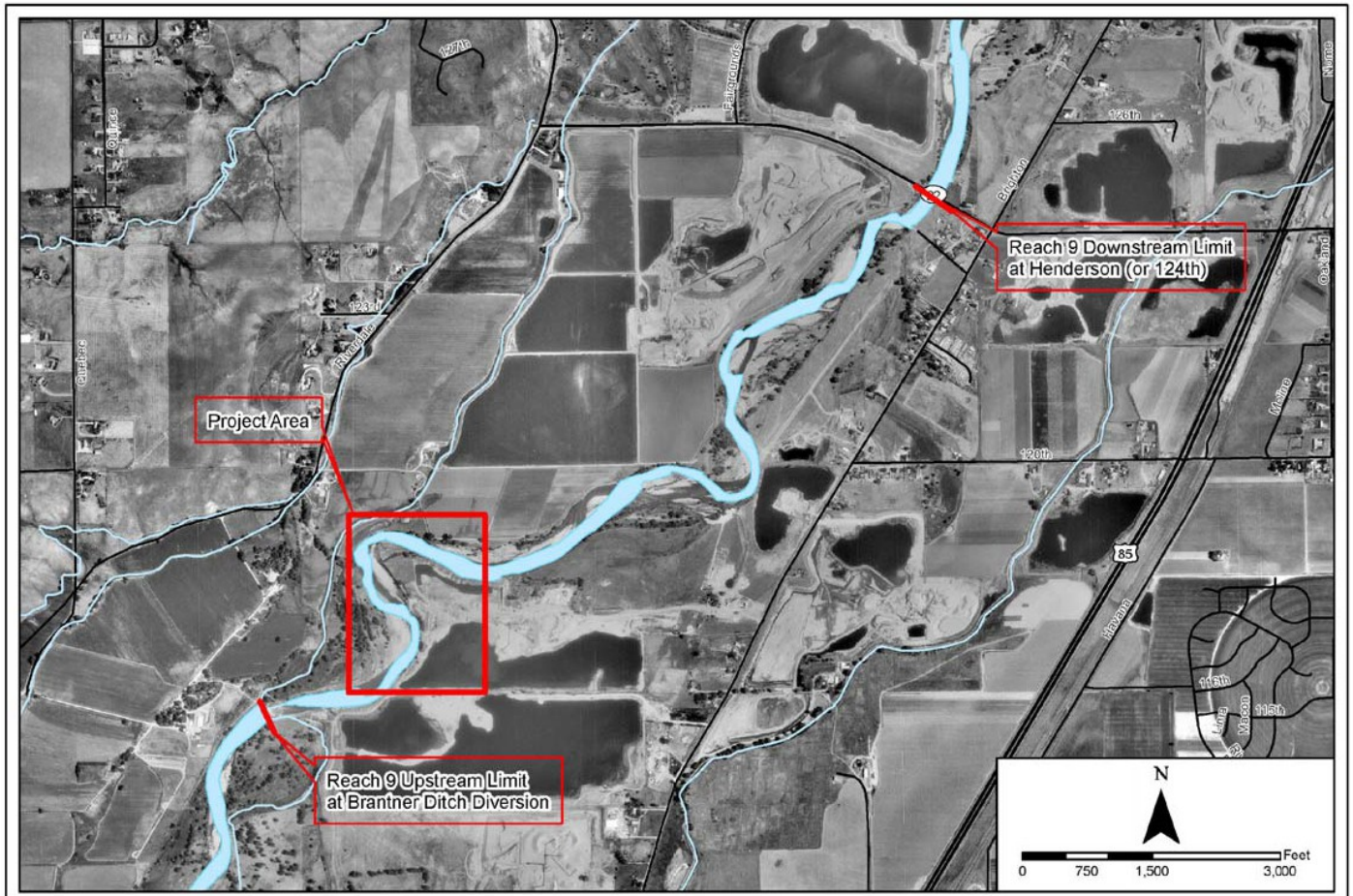
Presentation Overview

- Project Background
- Design Criteria
- Habitat Structures
- Habitat Suitability

Project Location



Project Area



Project Area

Background

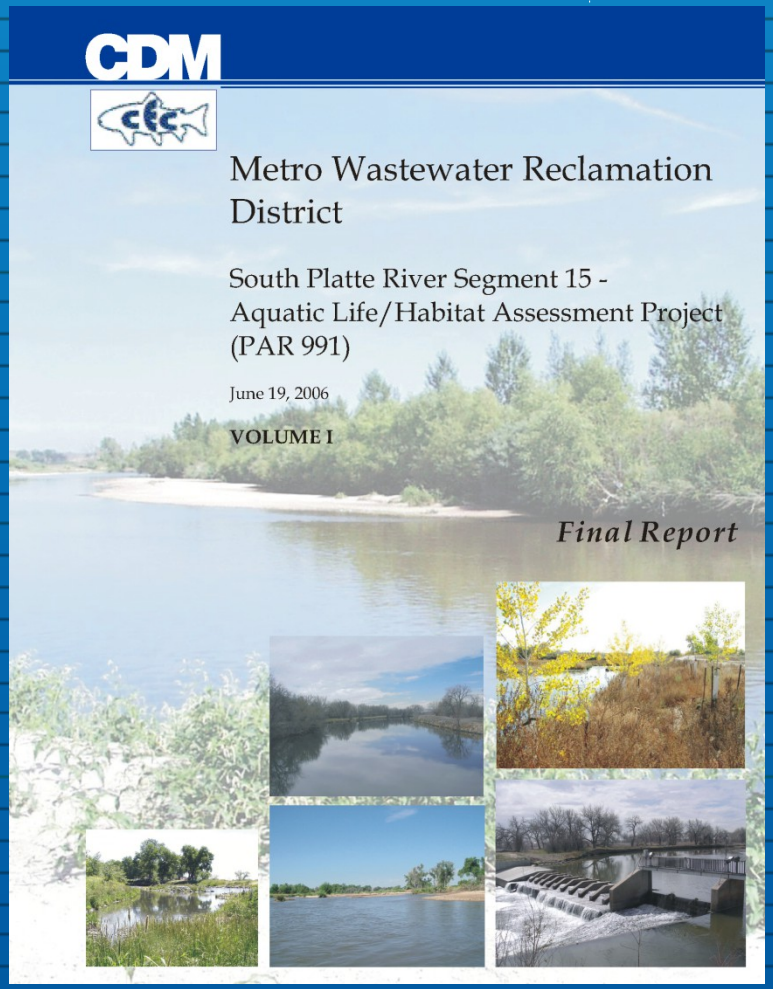
- Overall Segment 15 habitat quality
  - low for indigenous fish species
- Previously considered approaches
  - improve habitat via flow equalization
  - provide fish exclusion facilities to reduce fish loss via entrainment in irrigation diversions → not considered feasible
- Aquatic habitat improvements → more effective approach
  - physical habitat enhancement

Background

- District commissioned Aquatic Life/Habitat Assessment Study Phase Report (CDM Smith 2005)
  - initial assessment of Segment 15 to
  - identify structure and deficiencies,
  - identify opportunities for habitat improvements
  - recommended habit improvements based on what was perceived as missing
    -
      - protective cover,
      - pool/riffle structure,
      - secondary channels, and
      - backwater wetlands.

Background

- Outcome
  - conceptual level habitat improvements and locations
  - recommended implementation of habitat improvements using a phased approach
  - 20-year program with capital improvements occurring in first 7 years (2008 – 2014)



Background

- Phase I (Complete) -$700,000
  - extended over 3 years with capital improvements in first year and monitoring in years 2 and 3 (2009 - 2010)
- Phases II (Complete) - $550,000
  - Design: Sept. 2010 – June 2011
  - Construction: Dec. 2011 – May 2012
- Phases III through V
  - next 8 years with approximately one phase every two years (2012 - 2020)
- Phase VI (monitoring)
  - year 2 through 20 (2010 - 2028)

Design Criteria

- Target Species
  - Darters
  - Shiners
  - Suckers
  - Minnows
- Integrated set of structures
  - flow depth
  - velocity
  - stream cover
- Provide channel complexity

Habitat Structures

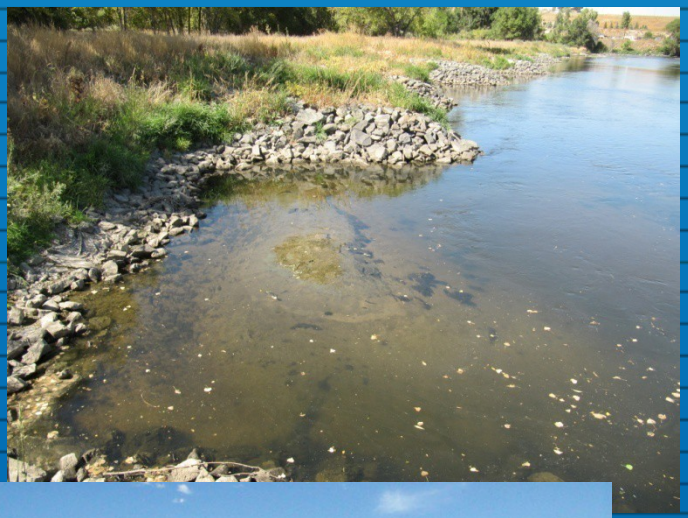
- Riffles
- Spur Dikes
- Boulder clusters
- Wing and V-type deflectors
- Groins
- Snags
- Cover logs
- Lunkers

Habitat Structures

- Riffles

Habitat Structures

- Spur Dikes
  - redirect stream flow
  - Form downstream scour holes
  - eddy areas of reduced velocity
  - provide bank protection

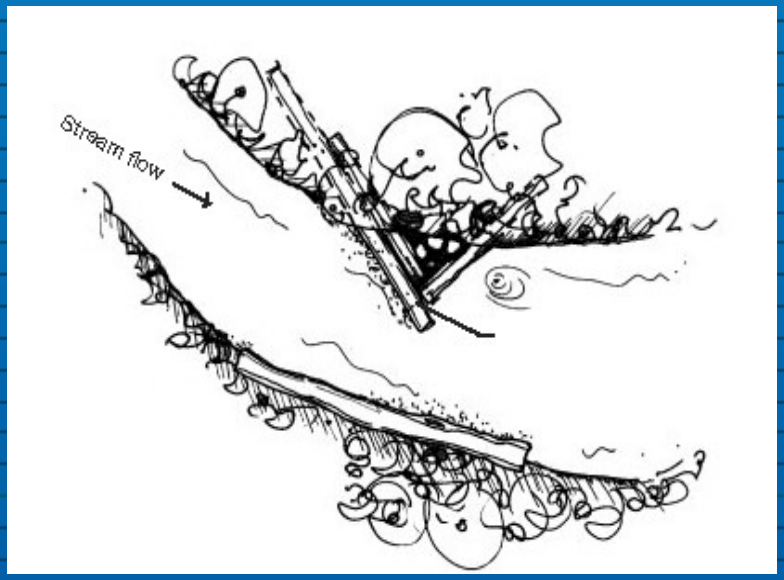


Habitat Structures

- Boulder clusters
  - downstream scour holes
  - eddy areas of reduced velocity
  - provide protective cover

Habitat Structures

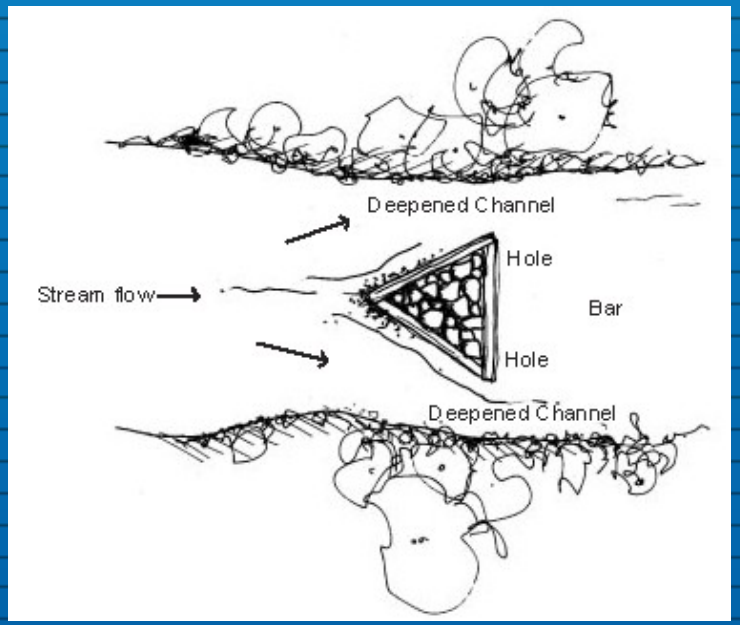
- Wing and V-type deflectors
  - redirect and accelerate flow away from the bank
  - create scour pools by constricting the channel.



Wing Deflector

Habitat Structures

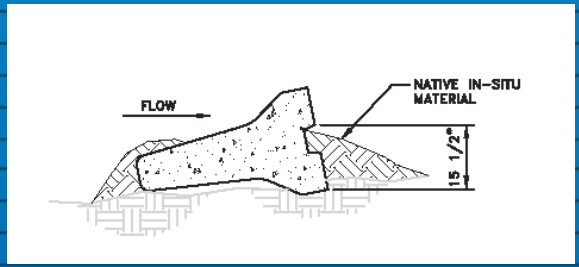
- Wing and V-type deflectors (cont'd)



V-Type Deflector

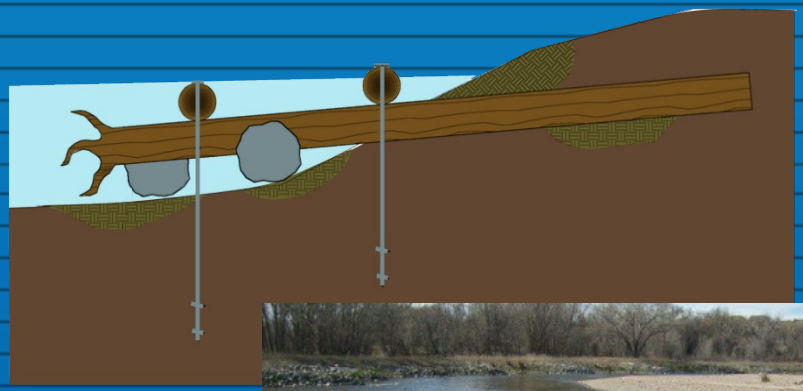
Habitat Structures

- Groins
  - induce sediment deposition
  - create scour holes by altering flow direction
  - Jersey barriers rather than boulders



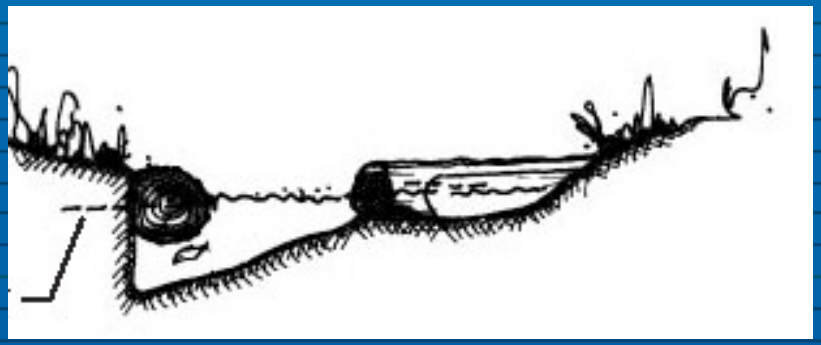
Habitat Structures

- Snags



Habitat Structures

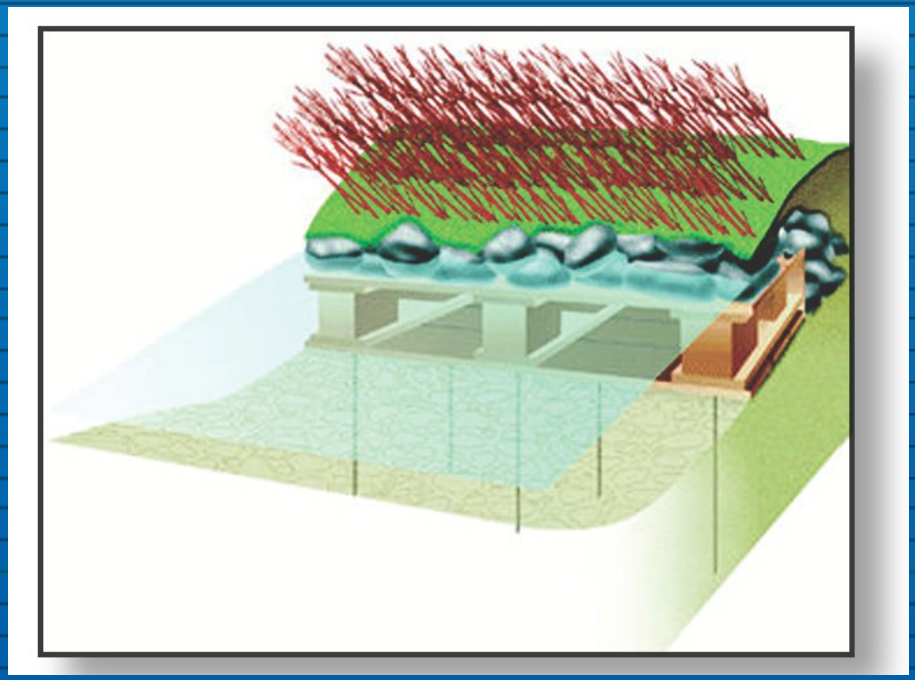
- Cover logs
  - installed at edge of the bank
  - provide resting areas
  - overhead cover
  - catchment of debris drifting with the current



Source: Stream Corridor Restoration Handbook, USDA; The Restoration of Rivers and Streams, Gore, James A.

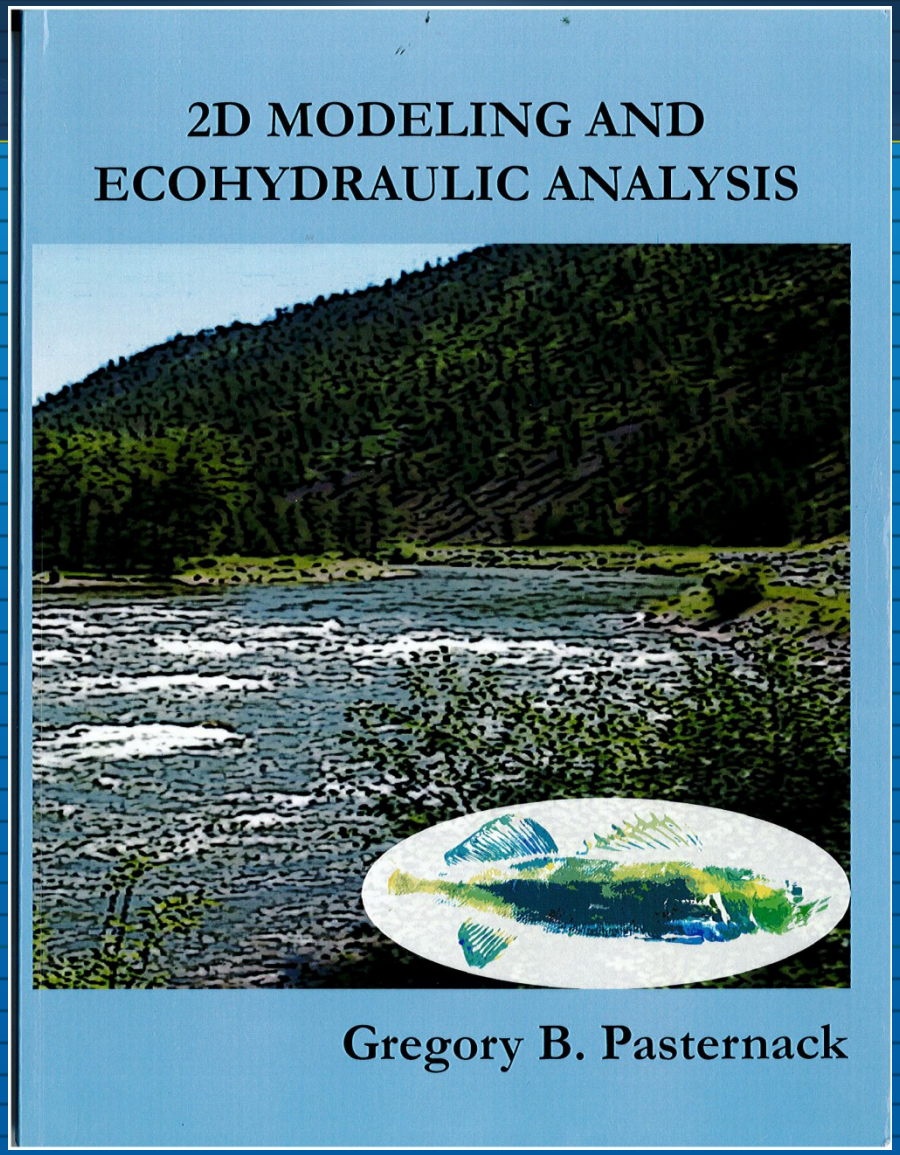
Habitat Structures

- Lunker structures
  - provide resting areas and shade

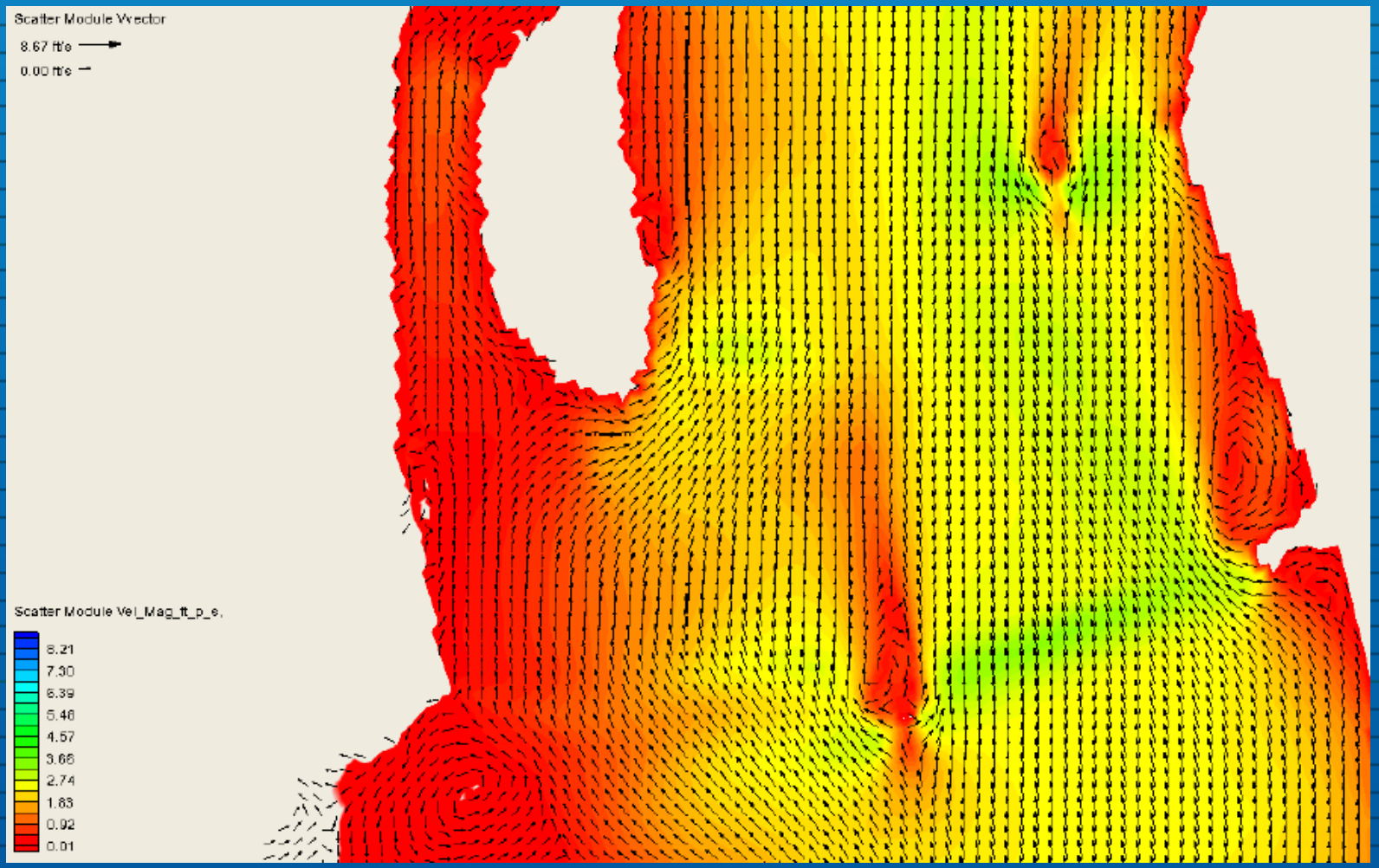


Source: Maryland . 2006. Maryland's Waterways Construction Guidelines. Maryland Department of the Environment.

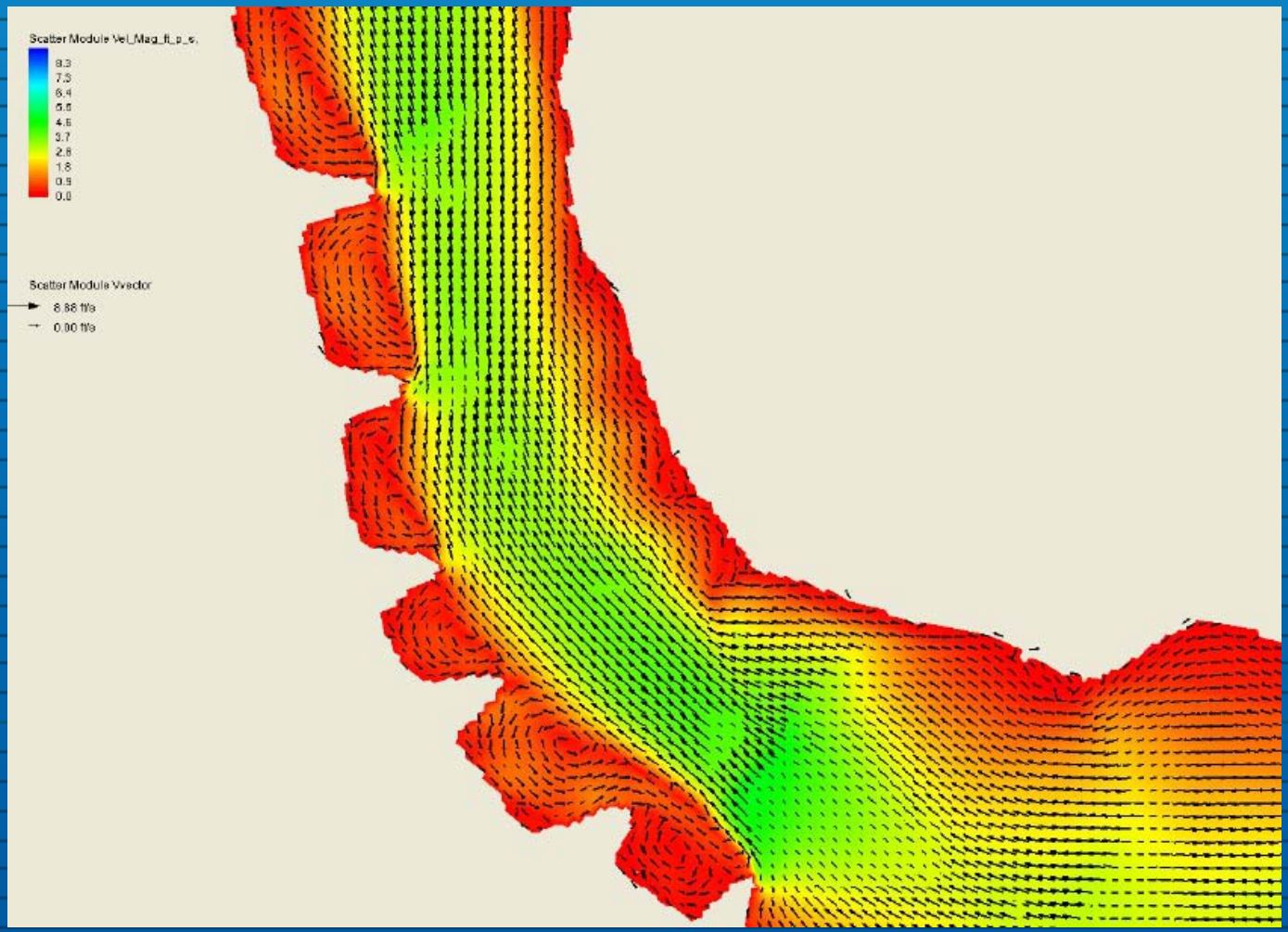
Habitat Suitability



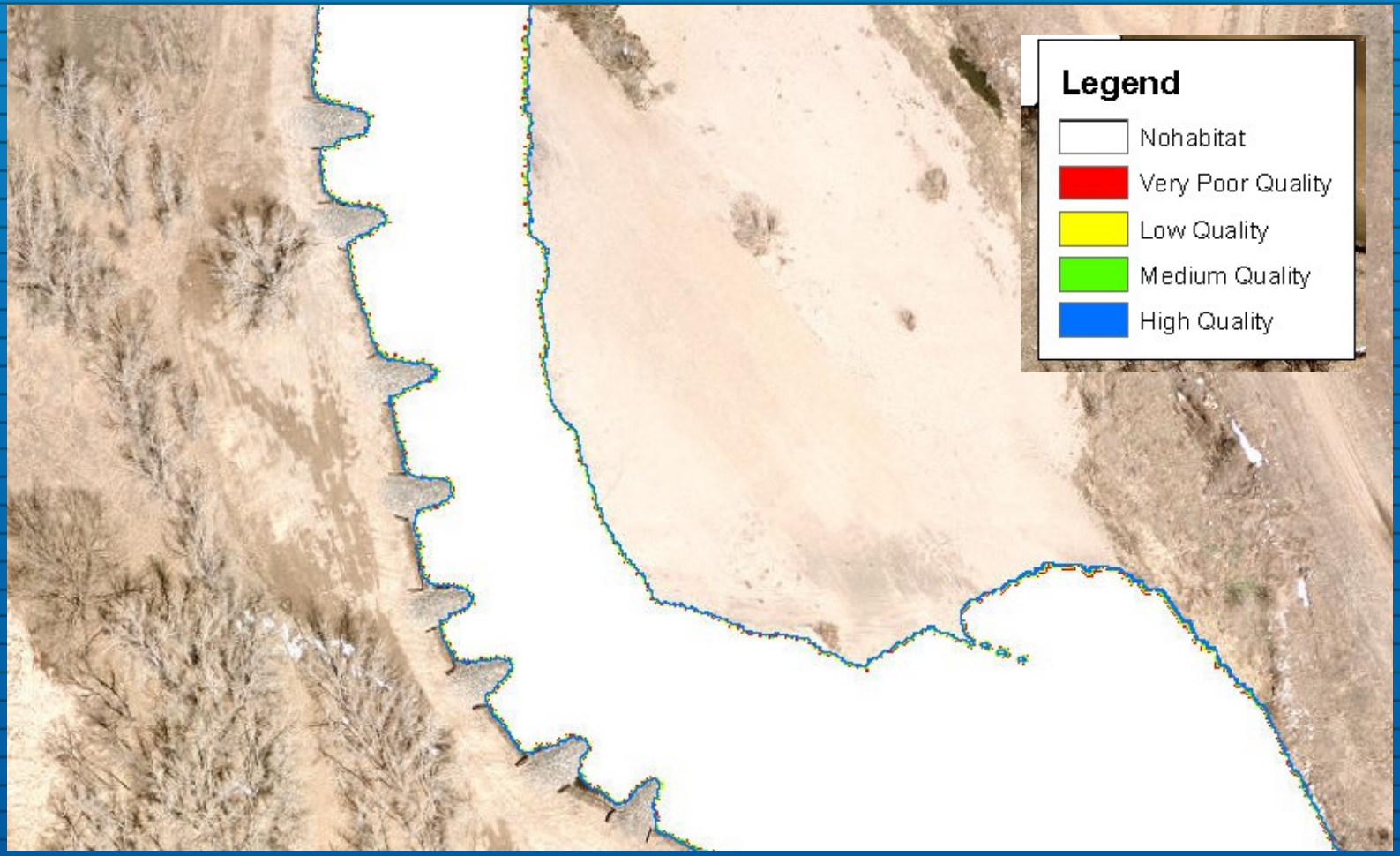
Habitat Suitability – Velocity Fields



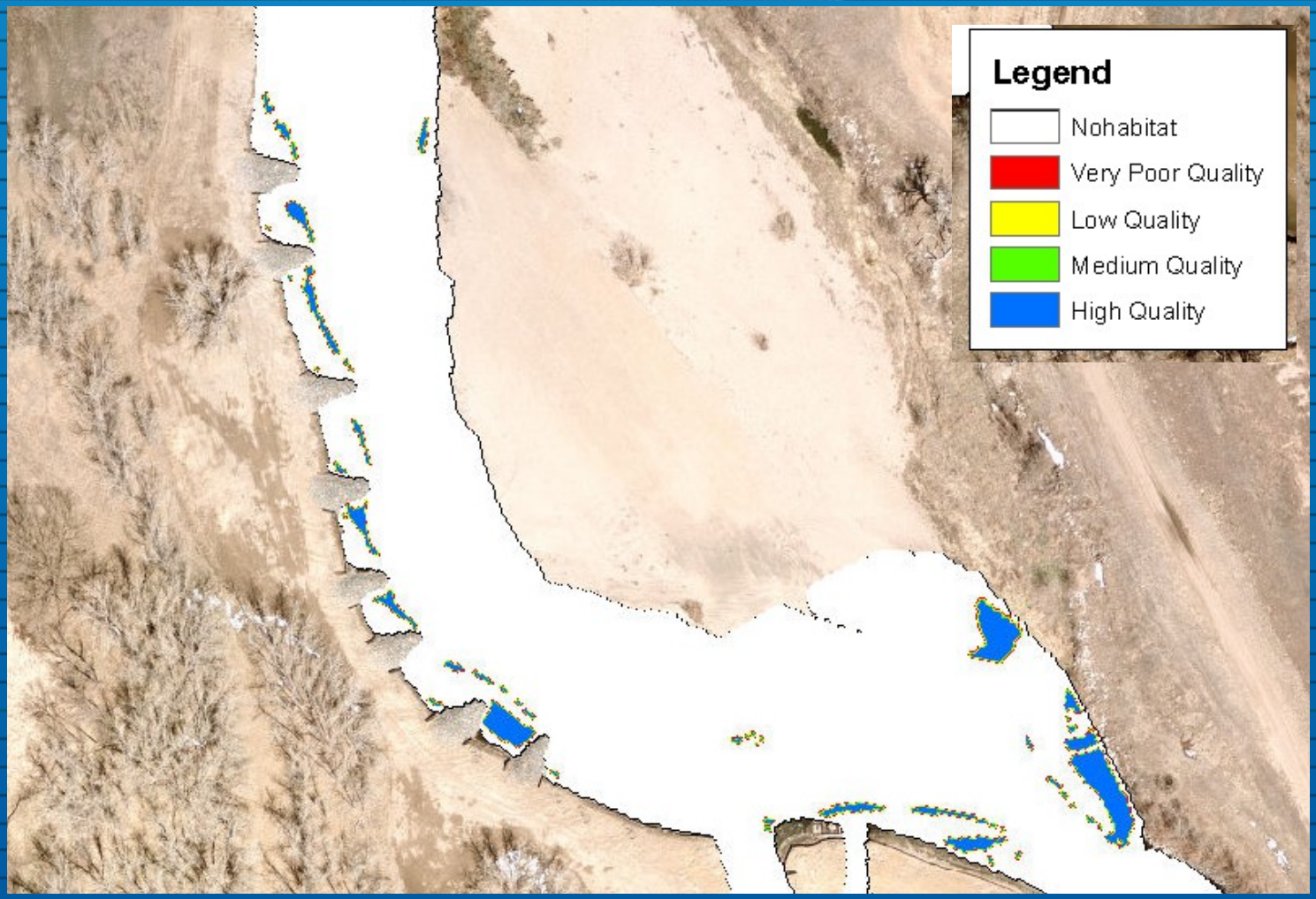
Habitat Suitability – Velocity Fields



Habitat Suitability – Common Shiner

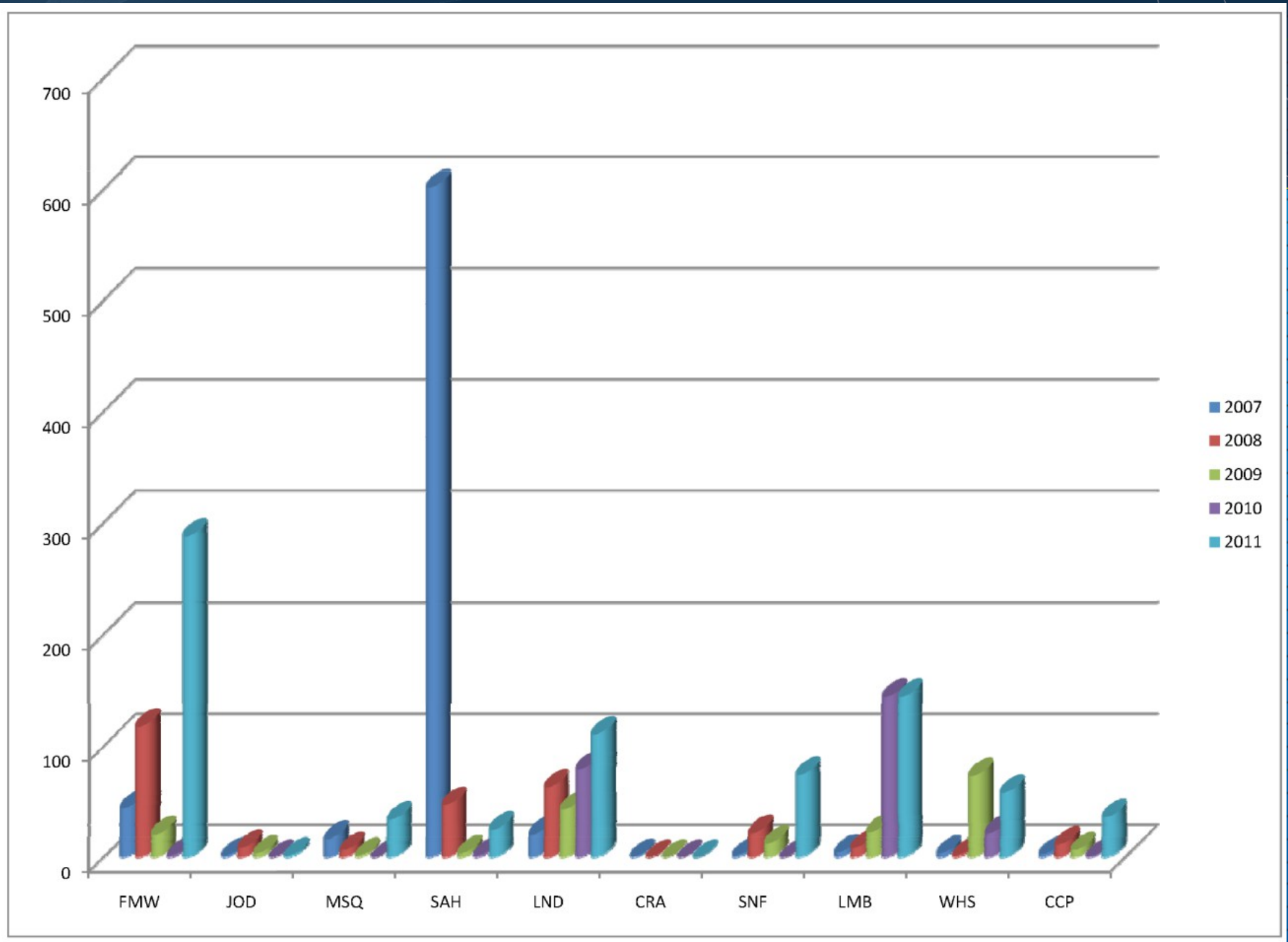


Habitat Suitability – White Sucker



Habitat Suitability

- Metro Sampling Data
  - Annual sampling in this area since 2007
  - Collected samples pre-construction and post-construction
  - Phase 1 and Phase 2 sampling location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CCP
2007
2008
2009
2010
2011

Questions

Construction Challenges

- Water control

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Construction Challenges

- Water control

Construction Challenges

- Water control

Construction Challenges

- Water quality

Construction Challenges

- Helical anchors

Construction Challenges

- Elevation Control

Construction Challenges

- Scour